

**Management Advisory Report: An Evaluation
of Digital Analysis as a Potential Technique
for Identifying Erroneous Fuel Tax Claims**

May 2001

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DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

INSPECTOR GENERAL
for TAX
ADMINISTRATION

May 24, 2001

MEMORANDUM FOR COMMISSIONER, SMALL BUSINESS/SELF-EMPLOYED
DIVISION

A handwritten signature in cursive script, reading "Pamela J. Gardiner".

FROM: Pamela J. Gardiner
Deputy Inspector General for Audit

SUBJECT: Final Management Advisory Report – An Evaluation of Digital
Analysis as a Potential Technique for Identifying Erroneous Fuel
Tax Claims

This report presents the results of a test to determine whether digital analysis could be effectively used as a tool for identifying erroneous or fraudulent fuel tax claims. The test was a collaborative effort by the Internal Revenue Service (IRS) and the Treasury Inspector General for Tax Administration that relied extensively on reviews of claims performed by IRS excise tax agents and statistical analyses performed by the IRS' former Ohio District Office of Research and Analysis (DORA).

In summary, the test showed that digital analysis was not an effective technique for identifying erroneous fuel tax claims. Although the IRS' reviews of claims filed by the sample of taxpayers selected for the test resulted in the assessment of almost \$247,000 in additional taxes, the IRS excise tax agents found that the vast majority of claims filed by these taxpayers were accurate.

Management agreed with our conclusion, and the full text of their comments is included as an appendix. Copies of this report are also being sent to the IRS managers who are affected by the report. Please contact me at (202) 622-6510 if you have questions or Gordon C. Milbourn III, Associate Inspector General for Audit (Small Business and Corporate Programs), at (202) 622-3837.

Management Advisory Report: An Evaluation of Digital Analysis as a Potential Technique for Identifying Erroneous Fuel Tax Claims

Objective and Scope

The objective of the review was to determine whether digital analysis could be effectively used to identify erroneous fuel tax claims.

We worked with the IRS' Excise Tax and DORA functions to test the feasibility of using digital analysis on fuel tax claims.

Our objective was to determine whether digital analysis could be effectively used by the Internal Revenue Service (IRS) to identify potentially erroneous and/or fraudulent fuel tax claims. Digital analysis is a technology designed to find anomalies in corporate data. It is based on a mathematical theory known as Benford's Law that established the digital patterns normally found in authentic and unmanipulated data. Digital analysis has been successfully used in conjunction with Benford's Law to identify financial fraud in both the government and private sectors.

To test the feasibility of using digital analysis on fuel tax claims, we obtained the assistance of the IRS' Office of Excise Taxes in Washington, DC, the IRS' District Office Research and Analysis (DORA) Division in Cincinnati, Ohio, and the IRS' Excise Research function in Covington, Kentucky. A DORA statistician applied Digital Analysis Tests and Statistics (DATAS) software to the IRS' national database of approximately 178,000 fuel tax claims filed in 1997 and 1998.¹ The statistician's analysis determined that the refund amount of the claims filed by about one-third of the taxpayers who had filed 20 or more claims each year did not conform to the predicted digital patterns. This indicated that digital analysis could be used with Benford's Law as a potentially effective tool for identifying fraudulent claims and/or productive examination cases.

The statistician selected a sample of 204 taxpayers for examination by IRS excise tax agents. Each of the taxpayers had filed a minimum of 20 claims. The sample included taxpayers whose claims "passed" Benford's Law (i.e., conformed to the expected digital patterns) and taxpayers whose claims "failed" Benford's

¹ We did not conduct tests to establish the completeness of the IRS' data files or assess the effectiveness with which the DATAS software was applied to these data files.

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The evaluation of digital analysis was based on the IRS' examination of fuel tax claims filed by 191 taxpayers.

Law. The sample included taxpayers from 29 of the 33 IRS district offices that existed prior to the IRS' reorganization in October 2000. Details of the sampling plan are presented in Appendix I.

As of December 13, 2000, the IRS' excise tax agents in these districts had completed reviews of the claims filed by 191 of the sampled taxpayers. The scope of our work was limited to an evaluation of these examination results. We did not assess the technical quality of the reviews.

This test of digital analysis was originally initiated as part of our 1999 audit of the processing of fuel tax credits. The final report² for that audit was issued on March 30, 2000. We are reporting the digital analysis test results separately due to the need to wait until the IRS substantially completed its reviews of the sampled fuel tax claims. This review was performed in accordance with the President's Council on Integrity and Efficiency's *Quality Standards for Inspections*.

Major contributors to this report are listed in Appendix II. Appendix III contains the Report Distribution List.

Background

The federal government levies excise taxes on the sale, use, and inventory of various types of goods or services, including fuels such as gasoline and diesel. Excise taxes may be refunded when taxed fuel is subsequently used for tax-exempt purposes or when the fuel is taxed a second time.³

Taxpayers who paid excise taxes on tax-exempt or double-taxed fuel may request a refund from the IRS by

² *Opportunities Exist for Further Reducing Erroneous Fuel Tax Credits* (Reference Number 2000-30-057, dated March 2000).

³ Fuel can be taxed a second time when, for example, one fuel producer sells fuel to another fuel producer.

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The IRS processed more than \$500 million in fuel tax claims during 1998.

filing a Claim for Refund of Excise Taxes (Form 8849). These taxpayers are frequently wholesale distributors of gasoline and registered ultimate vendors of diesel fuel who buy the fuel at a price that includes the excise tax and subsequently sell it at a tax-excluded price to state and local government entities, non-profit educational organizations, or farms for farming purposes. Taxpayers who meet certain dollar requirements may file multiple claims throughout the year rather than waiting until the end of the tax year. The refund claim amount is calculated by multiplying the number of gallons of fuel purchased by the applicable fuel tax rate. These rates vary for each type of fuel.

During Calendar Year (CY) 1998, the IRS processed almost 90,000 claims and refunded approximately \$500 million in fuel taxes. Although all Forms 8849 are reviewed prior to payment by revenue agents or tax auditors in the Centralized Excise Program Section at the Cincinnati IRS Center, the IRS has no specific data-driven programs for selecting claims for examination by excise tax agents in the field.

Fraud control is an area of high importance and concern in the IRS' efforts to promote voluntary compliance. The General Accounting Office (GAO) has reported⁴ that, while the IRS has detected several scams involving refunds of gasoline or diesel fuel excise taxes, it does not know how extensive this fraud may be. The GAO stated that the incentives to obtain fraudulent excise tax refunds are great because of the rising fuel tax rates.

Results

Digital analysis is apparently not an effective method for identifying potentially erroneous and/or fraudulent fuel tax claims. This conclusion is based on the results of the IRS' reviews of claims that were selected by using

⁴ *Tax Administration: Diesel Fuel Excise Tax Change* (Letter Report, dated January 16, 1996, GAO/GGD-96-53).

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digital analysis techniques. The completed reviews resulted in the assessment of additional taxes against only 8 percent of the sampled taxpayers. The taxpayers whose claims did not conform to Benford's Law did not have a significantly higher change rate or adjustment amount than the taxpayers whose claims conformed to Benford's Law.

Digital Analysis Is Apparently Not an Effective Technique for Identifying Potentially Erroneous and/or Fraudulent Fuel Tax Claims

Through December 13, 2000, IRS excise tax agents had completed reviews of the fuel tax claims filed by 191 taxpayers selected for examination using digital analysis techniques. The completed reviews found that the claims filed by 92 percent of the taxpayers were correct as filed.

The IRS' examinations of fuel tax claims selected using digital analysis produced only an 8 percent change rate.

Additional taxes totaling \$246,833 were assessed against the remaining 8 percent of the sampled taxpayers. The completed reviews found no evidence of fraud. Further, neither the change rate nor the adjustment amount was significantly higher for those taxpayers whose claims did not conform to the digital patterns expected by Benford's Law.

Analysts and statisticians from the Excise Research and DORA functions provided the following potential reasons that digital analysis was not an effective approach for identifying erroneous fuel tax claims:

The IRS offered several possible reasons that digital analysis was ineffective for identifying erroneous fuel tax claims.

- Most claimants were registered ultimate vendors and are subject to IRS reviews every 2 years.
- Many claimants operate in a controlled environment. Fuel purchases are generally delivered by tanker load or by tank wagons. Therefore, the quantity of fuel ordered and delivered would generally involve a consistent number of gallons. Thus, there would be a high probability that the first, second, and, possibly, the third digits of the claim amounts would

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be repetitive and, therefore, would not follow the expected digital patterns according to Benford's Law.

- Claimants tend to file periodically. Having a reasonably constant volume of fuel sales would lead to smaller deviations in the refund amounts of the claims than would be expected by Benford's Law.
- Claimants might have some "business" reason for filing a claim when the total amount reaches a certain dollar level. Therefore, these claims would not follow Benford's Law.

Conclusion

Digital analysis is apparently not an effective tool for identifying inaccurate fuel tax claims. The IRS' reviews of sampled claims produced only an 8 percent change rate and found no fraud. Further, the no change rate and the adjustment amounts were not significantly higher among taxpayers whose claims "failed" Benford's Law than among those taxpayers whose claims "passed" Benford's Law.

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Appendix I

Sampling Methodology

The Internal Revenue Service's (IRS) District Office Research and Analysis (DORA) Division, Ohio District, developed the sampling plan presented in the following table to test whether digital analysis could be effectively used to identify erroneous fuel tax claims. The sample identified 204 taxpayers for examination by IRS excise tax agents and was designed to ascertain the difference between categories of claimants.

Sampling Summary

<u>Claim Category</u>	<u>Benford's Law Test Category</u>	<u>Frequency</u>	<u>Percentage</u>	<u>Sample Size</u>	<u>Percentage of Strata Sampled</u>
Less than \$150,000	Passed	787	51%	34	4%
Less than \$150,000	Failed 1998	235	15%	34	14%
Less than \$150,000	Failed 1997 and 1998	144	9%	34	24%
Greater than \$150,000	Passed	224	14%	34	15%
Greater than \$150,000	Failed 1998	82	5%	34	41%
Greater than \$150,000	Failed 1997 and 1998	79	5%	34	43%
		1,551	100%¹	204	

Source: IRS DORA Division, Ohio District

The Excise Research function at the Cincinnati IRS Center assimilated audit packages that contained the original claims, an audit checksheet and procedural guide, and other information for each taxpayer. These packages were forwarded to field excise tax groups for examination. The completed examinations were returned to the Excise Research function for review and tabulation.

¹ Numbers do not equal 100 percent due to rounding.

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Appendix II

Major Contributors to This Report

Gordon C. Milbourn III, Associate Inspector General for Audit (Small Business and Corporate Programs)

Philip Shropshire, Director

William E. Stewart, Audit Manager

Michael R. Van Nevel, Senior Auditor

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Appendix III

Report Distribution List

Commissioner N:C
Commissioner, Large and Mid-Size Business Division LM
Deputy Commissioner, Large and Mid-Size Business Division LM
Deputy Commissioner, Small Business/Self-Employed Division S
Acting Director, Internal/External Stakeholders, Small Business/Self-Employed Division,
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Commissioner, Small Business/Self-Employed Division S

Outcome Measures

This appendix presents detailed information on the measurable impact that this evaluation of digital analysis for selecting fuel tax claims for examination had on tax administration. These benefits will be incorporated into our Semiannual Report to the Congress.

Type and Value of Outcome Measure

Increased revenue/revenue protection – Actual; the Internal Revenue Service's (IRS) reviews of the fuel tax claims filed by taxpayers selected for inclusion in the test of digital analysis resulted in the assessment of additional taxes totaling \$246,833; (see page 4)

Methodology Used to Measure the Reported Benefit:

The information on the amount of additional taxes assessed was provided by the IRS' Excise Research function in Covington, Kentucky, which was responsible for tabulating the examination test results.

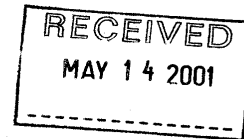
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Appendix V

Management's Response to the Draft Report



DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, D.C. 20224



MAY 10 2001

MEMORANDUM FOR DEPUTY INSPECTOR GENERAL FOR AUDIT

FROM:

Joseph G. Kehoe
Joseph G. Kehoe
Commissioner, Small Business/Self-Employed Division

SUBJECT:

Draft Management Advisory Report – An Evaluation of Digital
Analysis as a Potential Technique for Identifying Erroneous Fuel
Tax Claims

I appreciate the opportunity to respond to the subject draft management advisory report.

I agree the digital analysis is not an effective technique for identifying incorrect fuel tax claims. The sampled claims identified by this study produced only an eight-percent change rate; as such there are no expected benefits from the use of this analysis tool. Since there are no recommendations included in the report, no further action by this office is required.

Thank you for the opportunity to work with you on this study. If you have any questions, please call Sharon Oliver, Director, Reporting Compliance, at (202) 622-3217.